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THE CASE AGAINST MUNICIPAL SOLID WASTE INCINERATION

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THE CASE AGAINST MUNICIPAL SOLID WASTE INCINERATION

On April 11, 1991, Ontario's environment minister announced a ban on the construction of future municipal solid waste incinerators in the province. The ban received legal force with a regulation passed by the government of Ontario on September 11, 1992.

The province also has placed more stringent performance requirements on existing incinerators. Apartment incinerators were phased out in 1989.

The ban was enacted in response to serious human health and environmental impacts, economic considerations and waste management concerns:

1) The air emissions from incinerators are a potential threat to both human health and the health of the environment. Incinerators generate a wide variety of toxic heavy metals and organic contaminants that may endanger human health, as well as waste gases that cause acid rain, smog and global warming.

2) Solid waste incinerators create large quantities of slag, ash and other solid waste residues. Much of this waste material is contaminated and must be sent to hazardous waste treatment and disposal facilities.

3) Incineration is less cost-effective than recycling and other 3Rs waste minimization alternatives. It is more expensive than even other waste disposal options, including landfilling.

4) The incineration of recyclable materials and other valuable components in the solid waste stream is incompatible with programs supporting waste reduction, reuse and recycling.

5) Incineration is inconsistent with a pollution prevention approach to protecting Ontario's air, water and land, adopted by the Ministry of Environment and Energy.

Incineration Threatens Human Health and the Environment

Even when equipped with the latest emission controls, municipal solid waste incinerators release a wide range of pollutants that may effect human health and the health of the environment. Although solid wastes are usually considered non-hazardous, they are contaminated with thousands of potentially dangerous compounds, including used oils and paints, old drugs and pesticides, mercury batteries, glues, solvents, inks and dyes.

In addition, the basic chemical building blocks that make up most solid wastes can recombine under the high temperatures found in an incinerator to form new and much more dangerous compounds.

Air emissions going up the incinerator stack can include:

- nitrogen oxides (which cause both acid rain and urban smog),
- sulphur dioxide and hydrogen chloride (two other acid gases),
- the asphyxiating carbon monoxide,
- carbon dioxide (linked to global warming),
- toxic heavy metals (including lead, mercury, arsenic and cadmium), and
- dangerous organic compounds (such as dioxins and furans, PCBs, phenols and benzene).

These pollutants may travel hundreds of kilometres, contributing to global environmental problems, or quickly drift to the ground, settling out in lakes and building up in soils, crops and farm animals to add to the total toxic load on the environment. The meat and vegetables we eat and the milk and water we drink may be contaminated with hazardous chemicals released by solid waste incinerators. Trace levels of toxic organics and heavy metals in the air may even pose a direct risk to human health.

"[M]any public officials are embracing garbage incineration as a solution without recognizing that incineration is a poor alternative to landfilling as a waste management option and therefore has significant consequences in terms of environmental pollution and public health."

from a policy statement of The American Public Health Association in "Resource and Solid Waste Management," *American Journal of Public Health*, Vol. 80, Feb., 1990, pp. 230-231.

Scientists believe there is no truly safe exposure level for many of the toxic contaminants emitted by incinerators. Lead is a good example. It is a cumulative poison which can attack the nervous system at extremely low doses. It is particularly harmful to small children and can have severe effects on the brain development. The lead emitted from solid waste incinerators contributes significantly to our total exposure to this dangerous neurotoxin.
Many of the other heavy metals found in the off-gases from incinerators can have equally deleterious side effects:

- Mercury can impair the brain and damage the central nervous system. More than 80% of the mercury in the burning solid waste evaporates out the stack.

- Cadmium can attack the nervous system, kidneys and lungs. It is known to cause birth defects in animals and likely causes cancer in humans. Cadmium and most other heavy metals condense on tiny dust particles that are easily inhaled into the lungs.

- Arsenic, chromium and beryllium are human and animal carcinogens which can also impair brain functioning. Scientists have not been able to establish a safe exposure level for carcinogens.

- Nickel, copper, selenium, zinc and vanadium are all potent toxins which can have severe effects if inhaled or ingested.

Many of the most dangerous chemicals emitted by municipal incinerators — such as the dioxins and furans, mercury, arsenic and cadmium compounds — are included on the Ministry of Environment's list of candidate substances for banning or phase-out. The list of 21 chemicals, released in April, 1991, is based on defensible scientific criteria and the Ministry is committed to eliminating the environmental release of these compounds. The ban on municipal solid waste incinerators supports this commitment.

"[I]ncinerators and healthy communities don't mix. The days of creating hazardous waste by burning garbage are over."

Zen Makuch, Canadian Environmental Law Association, from a news conference by It's Not Garbage, August 13, 1992 -

However, the ban is also based, in part, on unanswered environmental and health questions that have been raised about incineration emissions. For instance, scientists don't know enough about the long term toxic effects of many of the hundreds of other potentially dangerous compounds produced through incineration. There is great uncertainty about how these contaminants move through the environment, how quickly they break down (if at all), how they combine with other pollutants, or how they can build up in the food chain.

Researchers have only begun to investigate the toxic effect of these pollutants on the most susceptible members of society. We know that many toxic chemicals can be more dangerous to developing embryos and young children, workers more heavily exposed to toxic chemicals on the job, and people who have become hypersensitive to even very low levels of hazardous contaminants.

In addition, the data collected on incinerator emissions is still largely incomplete. Testing usually is conducted at new facilities operating at peak performance. There is little information on the variety and concentration of pollutants that might be expected under day-to-day operating conditions from aging facilities. Incinerator emissions may also vary considerably, depending on the type of waste being burned. A large load of plastics

or solvents, for instance, could result in a huge surge of toxic emissions.

Even the newest incinerators have problems. Detroit's solid waste incinerator has operated at 60 per cent of its capacity since April 1990, when the Michigan Air Pollution Control Commission revoked its permit for failing to meet mercury emission limits.

A September 1989 stack testing report submitted to the Wayne County Health Department showed that the incinerator was emitting mercury at concentrations four times greater than allowed in its state permit and hydrochloric acid at levels 30 per cent higher than allowed. Several stack tests conducted in 1991 continue to show mercury emissions at concentrations double to triple the limit stipulated in the permit.

The Ontario Government filed a suit against the Detroit incinerator in April 1987 to require the installation of state-of-the-art technology on the incinerator before it began operating.

A 1992 German study concludes that dioxins, furans, PCBs and other hazardous substances can be reduced in emissions and ash from incinerators can be reduced, but not eliminated. Maximizing the reduction of these contaminants makes an incinerator less efficient as a producer of energy. Furthermore, according to the study, incinerators require co-ordination of a very complex system of machinery and operating procedures without breakdown or error if emissions are to be effectively minimized on a continuous basis. The study also found that more dioxins and furans exit an incinerator than enter it, and the composition of dioxins and furans that exit are more toxic than those that enter.

It will take decades of intensive research before all the questions about incinerator emissions and their health effects are completely answered. In the meantime, reasonable prudence avoids high-risk temptation by a quick technological fix to a social and environmental problem.

Similarly, it is prudent to avoid, whenever possible, discharging toxic chemicals into the air we breathe and the environment we rely on. The Ministry of Environment and Energy, in weighing the uncertain environmental and health risks posed by incineration, has chosen the most prudent route and banned the construction of future municipal waste incinerators.

Incineration Creates Large Quantities of Ash

It is a myth that incineration makes solid wastes disappear. Some 70 to 80 percent of the wastes that are burned go up the stack as combustion gases, vapours and fine particulate. The rest, as much as 30 percent of the wastes (by weight), collects in the base of the incinerator as "bottom ash" and slag or is captured by the air pollution equipment. Engineers call this material "fly ash."

These residual wastes are usually contaminated with heavy metals and other dangerous contaminates and must be treated with special care in a hazardous waste disposal facility. Even the uncontaminated materials need to be collected and landfilled. Ironically, improvements in the efficiency of incinerator pollution control equipment — such as scrubbers and baghouses — has increased the concentration of contaminants remaining in fly ash. Tests conducted by Canada's National Incinerator Testing and Evaluation Program show that, as increasing controls are imposed on stack emissions, the quality of fly ash changes. The concentration of several toxic metals increases as does their potential for seeping out of the ash into the environment.

These residues — contaminated as they are with heavy metals — cannot be dumped into a conventional solid waste landfill. They require pretreatment to detoxify or immobilize the hazardous components. If untreated, they must be deposited in a specially designed landfill facility, equipped with continuous monitoring and groundwater protection measures.

"Municipal waste incinerators produce significant air emissions, as well as large quantities of bottom ash and toxic fly ash which must be disposed of, often as hazardous waste and at great cost."

Ellen Schwartzel, Pollution Probe. "Burning Desires," *Probe Post*, Summer 1991, pp. 24-31.

So incineration doesn't mean the end of landfills. They will still be needed for the solid waste residues of burning garbage. And the hazardous waste residues still require the siting and construction of very expensive hazardous waste facilities.

Incineration is the Most Expensive Disposal Option

As a disposal option, burning garbage also doesn't make economic sense.

In addition to the cost of disposal for bottom ash and toxic fly ash, an enormous sum of money is required to develop and operate incinerators. For example, a small plant handling between 300 and 400 tonnes per day would cost some $50 million to build and between $65 to $75 to process each tonne of solid waste it handles. The combined operating and capital costs (not including trucking charges) would add up to almost $125 a tonne.

A larger incinerator would offer some cost advantages, but these would be outweighed by greater capital costs and increased environmental hazards.

A facility burning about 3,000 tonnes of waste each day would cost an estimated $1 billion to build. Total annual capital and operating costs for a future incinerator would be in the order of $90 per tonne processed. It is unlikely that small incinerators would be built in the future because of their higher per-unit cost.

The final per tonne cost of incineration would, in fact be higher because of the social and environmental costs of burning waste. Emissions, noise, dust, litter, odour and the risks associated with the transportation of waste and toxic residues add an estimated 10 per cent to the "true costs" of incineration. Such costs should not be borne by the public taxpayer, but by generators of waste.

Replacement costs for landfills, assuming current environmental standards, range from $25 to $40 per tonne, depending on the size of the facility.

Incineration also requires special landfills for disposal. Using up scarce landfill space to get rid of the byproducts of another disposal method is not sound resource management.

It is clear that the final per tonne cost of incineration may be even higher in the future. This depends on a number of factors, such as the size and number of incineration units, the ever-increasing stringency of air pollution standards and controls, the cost of land, environmental liability insurance, hauling costs and the disposal costs and risks associated with toxic fly ash disposal.

Offsetting revenues can come from the sale of energy and disposal charges imposed by the incineration facility. Such revenues, which are extremely variable and not necessarily related to costs, can serve to reduce some direct operating costs. The same can be said for landfill methane energy generation and the sale of secondary materials from recycling facilities.

Finally, burning solid wastes for energy recaptures only a small percentage of their value. Recycling waste paper, for example, requires only half of the energy it takes to produce it from wood stocks, while cutting air and water pollution by more than 75 percent.

London's Victoria Hospital incinerator is one victim of the economics of burning municipal solid waste. Completed in 1987 and capable of burning 270 tonnes of waste per day, this facility was intended to be a source of energy facility, as well as a waste disposal unit. In practice, it has lost $13 million in the last four years and is now for sale. If the incinerator can't be sold, it will be shut down.

Incineration is Incompatible with the 3Rs

In addition to its environmental and economic liabilities, incineration is incompatible with a sound waste management strategy based on reduction, reuse and recycling.

Simply put, what is often called garbage actually consists of many usable resources. These include paper and plastic and metal and kitchen scraps and other potentially useful resources. It has been estimated that more than 80 percent of these materials can be reclaimed and recycled into valuable new products or composted to produce a rich soil supplement. The primary goal of Ontario's waste management policies is to transform the province from a wasteful consumer society into one that conserves its resources and reduces its wastes.

Ontario is making progress in implementing the 3Rs — the reduction, reuse and recycling of materials. Manufacturers are developing simpler, more durable goods and have reduced packaging waste. Consumers are buying recycled and recyclable products with less packaging. Ontario is the leading jurisdiction in North America with recycling and composting programs.

However, incineration could upset many of these new initiatives by squandering the most recyclable components in the waste stream. New incinerators would hamper the development of a strong and viable waste recycling industry in Ontario.

Incinerators and recyclers often compete for the same waste materials. Some valued recyclables — such as waste paper, cardboard and plastics — are sought by incinerators because of the high level of heat they produce when burned. The recycling of combustible waste streams, such as plastics, may be disrupted before they have a chance to get established. The ban on incineration will guarantee a steady supply of raw materials to provincial recyclers.

Today's ban will also protect tomorrow's supplies. Some recycling schemes are still years away from commercial practicality. The landfilling of solid wastes improves the chance of mining and reclaiming them in the future. If these materials are incinerated, they are gone forever.

"The modern state-of-the-art waste-to-energy trash incinerator is a sophisticated answer to the wrong question: the task is not to find a new place to put the trash, the real task is to find ways to unmake trash. Instead of spending billions of dollars trying to perfect the destruction of our discarded materials, we should be putting our efforts into recovering them.

Dr. Paul Connett, Associate Professor of Chemistry, St. Lawrence University, N.J. Excerpted from a lecture, Waste Management, "As If the Future Mattered", May 5, 1988.

Incineration and 3Rs activities compete directly for the same sources of public and private funds. However, incineration is part of the old, throw-away approach to waste management. Devoting our environmental energies to incineration is an investment in obsolescence. By investing in 3Rs options, the province has the opportunity to lead in the development and export of tomorrow's waste minimization technologies to the rest of the world.

Ontario's ban on municipal waste incinerators sends a clear message that disposal is not the answer to environmental problems caused by waste generation. Our waste management priorities must be concentrated on the 3Rs, with emphasis on reduction. Public and private sector efforts must be focused on building a strong infrastructure for recycling, ensuring the continued supply of recyclable materials, and supporting the growing market for recycled and reclaimed products.

The incineration of plastics, paper products, organic wastes and other such recyclable components is an inappropriate use of resources. Over both the short and long term, solid waste management through the application of the 3Rs involves fewer environmental risks and confers greater environmental benefits.

Incineration is Inconsistent with the Ministry's Pollution Prevention Strategy

The ban on the construction of municipal solid waste incinerators is consistent with the Ministry's comprehensive approach to protecting Ontario's land, water and air.

"The process of incineration generates a multitude of new compounds. Only a few of them are understood with regard to their composition and toxicological properties. The waste stream, with its current composition, generates during the incineration process the highly toxic dioxin and furan compounds, which cannot be prevented. A total containment of those toxins is impossible.

From a resolution adopted by the German Medical Association, Munich Region, Sept. 19, 1990 conference.

Pollution prevention is one of the cornerstones of this approach. The Ministry of Environment and Energy is putting in place policies and regulations which reflect the province's determination to turn back the tide of the never-ending waste stream which continuously degrades our environment.

Pollution prevention means any action which prevents or minimizes the creation of pollution. Incineration does the opposite. It is an out-of-site, out-of-mind approach with a great potential for creating future problems. Similar simplistic approaches in the past to deal with pollution problems has resulted in the severe deterioration of the Great Lakes and countless other Ontario rivers and streams, as well as the air we breathe.

The ecosystem approach to environmental protection views air, water and land inextricably linked as part of the earth's complex ecosystem. Transforming relatively benign domestic wastes into a brew of chemicals is regressive and counterproductive to a cleaner, healthier environment.

For more information on waste issues contact:

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